What is Claimed is:

1. An ArF excimer laser device comprising:

a pair of laser discharge electrodes which connect to an output terminal of a magnetic pulse compression circuit and which are located within the laser chamber; and a peaking capacitor connected in parallel with the pair of laser discharge electrodes; and

an output waveform of the laser pulse having a bifurcated form comprising a front half peak and a later half peak, wherein if the peak value of the front half peak is P_1 and the peak value of the later half peak is P_2 and the

(proportion of the pulse later half peak) = $P_2 / (P_1 + P_2) \times 100$ (%)

then the (proportion of the pulse later half peak) is 50% or more.

2. The ArF excimer laser device as claimed in claim 1, wherein a primary current that injects energy from the magnetic pulse compression circuit through the peaking capacitor into the discharge electrodes and a secondary current that injects energy into the discharge electrodes from the capacitor used to charge the peaking capacitor in the final stage of the magnetic pulse compression circuit are combined, and an oscillation cycle of the secondary current is set at 3 to 6 times an oscillation cycle of the primary current, such that a first half cycle and the succeeding 2 half cycles of the discharge oscillation current waveform form 1 pulse of laser oscillation activity, and the discharge oscillation current waveform is formed by the primary current combined with the secondary current and reverses polarity.

3. The ArF excimer laser device as claimed in claim 1, wherein a FWHM of the laser pulse output waveform is 20 ns or longer, and a duration of the output laser pulse is 50 ns or longer.

4. The ArF excimer laser device as claimed in claim 1, wherein the number of round trips in the optical resonator is five or more.

5. The ArF excimer laser device as claimed in claim 1, wherein the magnetic pulse compression circuit has a magnetic pulse compression section comprising a semiconductor switch and one or more stages of capacitor and magnetic switch,

and the capacitance Cp of the peaking capacitor and the capacitance Cn of the capacitor that charges the peaking capacitor in the final stage of the magnetic pulse compression circuit are in a proportion such that Cp/Cn does not exceed 0.75.

6. The ArF excimer laser device as claimed in claim 1, wherein a partial pressure of Ar in the laser chamber is 3% or less.

7. The ArF excimer laser device as claimed in claim 1, wherein total gas pressure in the laser chamber is 3.5 atmospheres or less.

8. The ArF excimer laser device as claimed in claim 1, wherein the interelectrode gap of the discharge electrodes is no more than 17 mm.

9. The ArF excimer laser device as claimed in claim 1, wherein reflectivity of an output mirror of a optical resonator located in the laser chamber does not exceed 50%.

10. The ArF excimer laser device as claimed in claim 1, wherein the magnetic pulse compression circuit has a magnetic pulse compression section comprising a semiconductor switch and one or more stages of a capacitor and a magnetic switch;

an inductance of a circuit loop comprising the peaking capacitor and the main discharge electrodes is from 4 to 8 nH;

a total gas pressure in the laser chamber is from 2.5 to 3.7 atmospheres;

a partial pressure of fluorine is no more than 0.1%;

a rise time until breakdown of the voltage impressed on the main discharge electrodes is from 30 to 80 ns; and

a capacitance Cp of the peaking capacitor and a capacitance Cn of the capacitor that charges the peaking capacitor in the final stage of the magnetic pulse compression circuit are in a proportion such that $0.45 < Cp/Cn < 0.75$.

11. The ArF excimer laser device as claimed in claim 10, wherein the capacitance Cp of the peaking capacitor is less than 10 nF.

12. A fluorine laser device comprising:

a pair of laser discharge electrodes which connect to an output terminal of a magnetic pulse compression circuit and which are located within a laser chamber; and

a peaking capacitor connected in parallel with the pair of laser discharge electrodes, wherein an output waveform of the laser pulse has a bifurcated form comprising a front half peak and a later half peak and, if the peak value of the front half peak is P_1 and the peak value of the later half peak is P_2 and the

(proportion of the pulse later half peak) = $P_2 / (P_1 + P_2) \times 100$ (%)

then the (proportion of the pulse later half peak) is 50% or more.

13. The fluorine laser device as claimed in claim 12, wherein a primary current that injects energy from the magnetic pulse compression circuit through the peaking capacitor into the discharge electrodes and a secondary current that injects energy into the discharge electrodes from the capacitor used to charge the peaking capacitor in the final stage of the magnetic pulse compression circuit are combined, and an oscillation cycle of the secondary current is set at 3 to 6 times an oscillation cycle of the primary current, such that a first half cycle and the succeeding 2 half cycles of the discharge oscillation current waveform form 1 pulse of laser oscillation activity, and the discharge oscillation current waveform is formed by the primary current combined with the secondary current and reverses polarity.

14. A KrF excimer laser device comprising:

a pair of laser discharge electrodes which connect to an output terminal of a magnetic pulse compression circuit and which are located within the laser chamber; and

a peaking capacitor connected in parallel with the pair of laser discharge electrodes, wherein an output waveform of the laser pulse has a bifurcated form comprising a front half peak and a later half peak and, if the peak value of the front half peak is P_1 and the peak value of the later half peak is P_2 and the

(proportion of the pulse later half peak) = $P_2 / (P_1 + P_2) \times 100$ (%)

then the (proportion of the pulse later half peak) is 50% or more.

15. The KrF excimer laser device as claimed in claim 14, wherein a primary current that injects energy from the magnetic pulse compression circuit through the peaking capacitor into the discharge electrodes and a secondary current that injects energy into the discharge electrodes from the capacitor used to charge the peaking capacitor in the final stage

of the magnetic pulse compression circuit are combined, and an oscillation cycle of the secondary current is set at 3 to 6 times an oscillation cycle of the primary current, such that a first half cycle and the succeeding 2 half cycles of the discharge oscillation current waveform form 1 pulse of laser oscillation activity, and the discharge oscillation current waveform is formed by the primary current combined with the secondary current and reverses polarity.